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High-Energy Beams for Simulating High-Yield Nuclear Events

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Disclaimer

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In FY12 we optimized the plan for a target that can combine six quads of beams into a single beam and did initial target design calculations. A gas filled tube with windows was illuminated with the 6 beams and an additional 10 heater beams in a HYDRA simulation. The efficiency of beam transmission through the entire plasma profile and the gain for the energy transfer process were analyzed. The target design produced shows that absorption can be kept to 30% with only 10 percent in the plasma column where the beam amplification occurs and 20% in the wings of the profile. The peak SBS gain is also sufficient for power transfer under the simulated conditions. Further work will optimize the heater pointing to produce the uniform profile and further minimize absorption in the wings.

The work performed this year has shown the feasibility of producing high transmission plasmas that can combine five or more quads at NIF, and has already produced a target design adequate for testing at NIF. The mid year start of this program necessitated some of the further work on optimizing the target be done in the following year. When complete, the target designed by this program will be tested on NIF as part of the present EPEC program with the results used to propose additional high energy EPEC experiments to NA22 and other interested agencies.

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